Exhibit R-2, PB 2010 Office of Secretary Of Defense RDT&E Budget Item Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 0400 - Research, Development, Test & Evaluation, Defense-Wide/BA 2 - Applied Research					R-1 ITEM NOMENCLATURE PE 0602234D8Z Lincoln Laboratory					
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	28.288	31.168	34.034						Continuing	Continuing
P534: Lincoln Laboratory	24.788	28.271	30.025						Continuing	Continuing
P535: Technical Intelligence	3.500	2.897	4.009						Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) The Lincoln Laboratory research line program (LL Program) is an advanced technology research and development effort conducted through a cost reimbursable contract with the Massachusetts Institute of Technology (MIT). The LL Program funds innovations that directly lead to the development of new system concepts, new technologies, and new components and materials. The LL Program contributed foundation technologies to two systems which received the 2002 Packard Excellence in Acquisition Award: (1) the Bio-aerosol sensing and micro-laser technologies were transferred to industry and are in production for the Joint Biological Defense Sensor (JBPDS), and (2) the Free-space optical communications technologies were used in the GeoLite optical communications satellite demonstration system.

(U) The LL Program currently has impact in five core technology thrusts:

(U) Advanced Electronics Technology, with emphasis on development of materials, devices, and subsystems utilizing microelectronic, photonic, biological, and chemical technologies to enable new system approaches to DoD sensors.
(U) Advanced Optical Communications, focusing on extremely efficient, free space optical communications links.
(U) Advanced Sensors, including the development of novel active and passive radio frequency and electro-optic sensors.
(U) Sensor Networking and Decision Support, with an emphasis on developing an integrated set of advanced technologies to improve the collection and use of sensor data to support military decision making.
(U) Counter Terrorism Technologies, aimed at developing technologies useful in the global war on terror.

(U) Supporting these five core technology thrusts is a work effort titled Technical Intelligence. Technical Intelligence will support detailed understanding of technology advancement in important scientific area and other scientific disciplines such as nanotechnology, directed energy and propulsion. Some details are classified, but one effort, called Global Dialogue on Emerging Science and Technology will be jointly sponsored by DOD, Department of State, and CIA will give very detailed insight in such topics as Software Engineering in India, Nanotechnology in South East Asia, European Laser development, for example. This information will in turn assist in development of U.S. capabilities.

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B. Program Change Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget	29.269	31.340	31.954	
Current BES/President's Budget	28.288	31.168	34.034	
Total Adjustments	-0.981	-0.172	2.080	
Congressional Program Reductions				
Congressional Rescissions		-0.172		
Total Congressional Increases				
Total Reprogrammings	-0.113			
SBIR/STTR Transfer	-0.803			
Undistributed Reduction	-0.065			
Balance attributed to program budget review adjustments			2.493	
Other			-0.413	

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COST ($ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P534: Lincoln Laboratory	24.788	28.271	30.025						Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) The Lincoln Laboratory program (LL Program) is an advanced technology research and development effort conducted through a cost reimbursable contract with the Massachusetts Institute of Technology (MIT). The LL Program funds advanced research activities that directly lead to the development of new system concepts, new technologies, and new components and materials, with impact in five core technology thrusts:

(U) Advanced Electronics Technology, with emphasis on development of materials, devices, and subsystems utilizing microelectronic, photonic, biological, and chemical technologies to enable new system approaches to DoD sensors.
(U) Advanced Optical Communications, focusing on extremely efficient, free space optical communications links.
(U) Advanced Sensors, including the development of novel active and passive RF and electro-optic sensors.
(U) Sensor Networking and Decision Support, with an emphasis on developing an integrated a set of advanced technologies to improve the collection and use of sensor data to support military decision making.
(U) Counter Terrorism Technologies, aimed at developing technologies useful in the global war on terror.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Advanced Electronics Technology	6.374	7.436	7.823	
FY 2008 Accomplishments: (U) Developed prototype ultrasensitive photon-counting detector arrays, scaleable to large sensor fields of view, to enable a new class of ISR sensors. Developed improved photon counting detectors useable in the short-wave infrared region for remote sensing applications. Continued development efforts on semiconductor processes enabling tiled focal plane arrays for gigapixel cameras, useful for large field-of-view persistent surveillance systems. Developed new techniques for detecting and pre-empting terrorist activity, employing tagging, tracking, and locating technologies and miniaturized low-power, long endurance microsensors. Developed technologies for highly integrated RF front ends, including silicon-based transceivers for use in low-cost RF systems. Continued development of solid state and semiconductor laser illuminators for low-cost bioaerosol sensors. Developed high power, narrow band				

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
laser to support multi-kilowatt laser beam combining. Continued efforts to transition technology to a wide range of DoD system demonstrations, and to industry for volume manufacturing. *FY 2009 Plans:* (U) Develop technologies for imaging focal planes which enable new approaches to Department of Defense electro-optical sensors. Develop unique integrated circuit designs and processes for ultra-low power electronics, high data collection rates, or operation in stressing environments. Develop technologies for highly integrated RF front ends, including silicon-based transceivers for use in low cost and reconfigurable RF systems. Continue development of solid state and semiconductor laser illuminators for active sensing and high power laser applications. *FY 2010 Plans:* (U) Continue technology development for imaging focal planes which enable new approaches to Department of Defense electro-optical sensors. Develop unique integrated circuit designs and processes for ultra-low power electronics, high data collection rates, or operation in stressing environments. Develop technologies for highly integrated RF front ends, including silicon-based transceivers for use in low cost and reconfigurable RF systems. Continue development of solid state and semiconductor laser illuminators for active sensing and high power laser applications.				
Advanced Optical Communications *FY 2008 Accomplishments:* (U) Developed a monolithic, single mode, laser diode array for low power laser communications applications. Demonstrated ultrasensitive, high speed photon-counting communications receiver in a laboratory experiment.	3.407	3.615	3.823	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
FY 2009 Plans: (U) Develop laser technologies to support agile beam communications concepts. Develop technologies to increase the data rate of ultra sensitive communications links. Develop advanced channel equalization techniques to allow wideband optical data transmission through scattering media. *FY 2010 Plans:* (U) Continue laser technology development to support agile beam communications concepts. Develop technologies to increase the data rate of ultra sensitive communications links. Develop advanced channel equalization techniques to allow wideband optical data transmission through scattering media.				
Advanced Sensors *FY 2008 Accomplishments:* (U) Completed design of low power Digital Focal Plane Array (DFPA) chip. Built and tested a portable, high resolution, wide field of view, infrared DFPA camera. Conducted coordinated target measurements involving a radar on one aircraft and a passive optical sensor and laser radar on a second aircraft. Improved the range resolution of the ultra-high-resolution laser radar. Identified multiple potential applications for 3D graph processor. Designed and fabricated a single chip, radar receiver with improved sensitivity and dynamic range. *FY 2009 Plans:* (U) Continue to improve sensitivity and data throughput rate of infrared digital focal plane array (DFPA) surveillance camera. Continue to investigate multiple input-multiple output (MIMO) radar architectures. Develop novel computer architectures designed specifically for rapidly processing data relevant to the Global War on Terrorism. *FY 2010 Plans:* (U) Continue technology development to improve sensitivity and data throughput rate of infrared digital focal plane array (DFPA) surveillance camera. Continue to investigate multiple input-multiple output (MIMO) radar architectures. Develop novel computer architectures designed specifically for rapidly processing data relevant to the Global War on Terrorism.	8.176	6.927	7.223	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Sensor Networking and Decision Support *FY 2008 Accomplishments:* (U) Used Intelligence, surveillance, and reconnaissance data from a computer-generated tactical scene and conducted an integrated laboratory decision-support demonstration. *FY 2009 Plans:* (U) Explore potential extension of low cost, networked chemical sensors to other distributed sensing applications. Pursue new approaches to chemical standoff sensing. Incorporate real-time processing and data links to allow cross-cueing among multiple sensor platforms. Demonstrate an integrated multi-source information /knowledge management architecture to provide decision support for the military. *FY 2010 Plans:* (U) Continue extension of low cost, networked chemical sensors to other distributed sensing applications. Pursue new approaches to chemical standoff sensing. Incorporate real-time processing and data links to allow cross-cueing among multiple sensor platforms. Demonstrate an integrated multi-source information /knowledge management architecture to provide decision support for the military.	3.159	5.195	4.931	
Counter Terrorism Technologies *FY 2008 Accomplishments:* (U) Evaluated a novel pathogen treatment in mice. Performed comparative testing of emerging chemical sensing technologies. Tested novel, early-warning perimeter chemical agent sensor at a remote site. Evaluated the utility of networked sensors for chemical and biological agent release detection and tracking. *FY 2009 Plans:* (U) Develop novel UAV sensing and wideband communications systems. Develop an architecture and system that employs a family of low cost, miniature, ground-based sensors. Develop automated software tools for terrorist threat network analysis and tracking.	3.672	5.098	6.225	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
FY 2010 Plans: (U) Continue development of novel UAV sensing and wideband communications systems. Develop an architecture and system that employs a family of low cost, miniature, ground-based sensors. Develop automated software tools for terrorist threat network analysis and tracking.				

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
P535: Technical Intelligence	3.500	2.897	4.009						Continuing	Continuing

A. Mission Description and Budget Item Justification

Technical Intelligence supports five core technology thrusts that combine efforts in two areas: 1) from the university community through the JASONs (this is not an acronym) program and 2) through information on maturation and development of technology throughout the rest of the world.

(U) JASONs is a group of approximately 50 appropriately cleared experts who provide detailed independent technical assessment of the most difficult technological problems. JASON members are mostly fully tenured professors in physics, mathematics, engineering, and hold active SCI-level clearances. Output from JASON studies are provided to levels up to the Secretary of Defense and their studies shape programmatic and technical decisions involving literally hundreds of millions of dollars. JASONs were previously funded through university research programs, but their level of technology maturity is appropriate for incorporation into Applied Research.

(U) The technical intelligence program will support collaborative work with the U.S. federal intelligence community on emerging and disruptive technologies, primarily through further development of the Science and Technology Net Assessment studies, which assess a select set of technologies from both a domestic and foreign development perspective. The program will also support focused technology and regional trend studies and collaborative work with international partner nations on assessments of emerging and disruptive technology and its application. The technical intelligence program will also support development of information technology based tools that enable collaborative analysis of emerging and disruptive technologies.

B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
Technical Intelligence	3.500	2.897	4.009	
FY 2008 Accomplishments: (U) The JASON studies and Technical Intelligence are focused in areas critical to national security. JASON studies were focused depending on the area most important in the security environment. For the Technical Intelligence portion; Some details are classified. The program supported detailed understanding of technology advancement in collaboration with the National S&T Intelligence Committee in the area of quantum information science. Additionally the program investigates emerging technology trends and assesses implication; one effort tasked the commissioning of a National Academy of				

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Sciences project under the National Research Council called Forecasting Future Disruptive Technology which investigated and published on methods for technology forecasting. This program provides very detailed insight in such topics as Information Technology, advancements in space technology, biotechnology applications for genetic engineering, meta-materials and an emerging area of study on energy technology. The program conducted a future technology war-game at the National Defense University, focused on the potential disruptive impact of commercially available technologies for increasing performance of warriors on the battlefield. Country specific reports on the science and technology sectors of specific countries were commissioned by the program with the library of congress federal research division (Four were completed in FY 2008: China, Israel, South Africa and Ukraine). An international project arrangement between the United States and Australia was finalized and international collaboration for the efforts were expanded to be tri-lateral with the United Kingdom on assessments of emerging and disruptive technology and its application. By funding and carefully targeting these opportunities, the DDR&E is able to better shape the Science & Technology (S&T) program. *FY 2009 Plans:* (U) Continue to focus the JASON studies and Technical Intelligence in areas critical to national security. JASON studies will be focused depending on the area most important in the security environment at the time. For the Technical Intelligence portion; Additional country specific S&T sector reports will be commissioned in by the Library of Congress Federal Research Division and finalized. In support of continued efforts to characterize technology trends and forecast the map of the future science and technology landscape this program will continue the National Academies project to forecast future disruptive technology and will sponsor several conferences in countries and technologies of interest. This program will participate in a tri-lateral arrangement with the United Kingdom and Australia to assess emerging and disruptive technology and will contribute to generation of tri-lateral research products on technology implications. The program will continue the effort of a National Academy of Sciences project under the National Research Council called Forecasting Future Disruptive Technology to identify national security impacts of forecasted technologies. In coordination with the National Intelligence Committee effort to Strengthen Science and Technology Analysis, this program will coordinate, and develop processes and mechanisms to integrate and coherently track defense S&T intelligence requirements				

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
and will conduct S&T net technical assessments in several areas such as energetic materials, micro-electronics, information assurance and neuroscience. *FY 2010 Plans:* (U) Continue to focus the JASON studies and Technical Intelligence in areas critical to national security. JASON studies will be focused depending on the area most important in the security environment at the time. For the Technical Intelligence portion; some details are classified. The program will conduct S&T net technical assessments on global technology advancement in collaboration with the National S&T Intelligence Committee in the areas such as electronic warfare, hypersonic aeronautics and others as identified by the S&T net assessment program in FY 2009. This program will continue tri-lateral collaboration with the United Kingdom and Australia to continue assessments on emerging and disruptive technology and will contribute to an international conference. The program will continue the effort of a National Academy of Sciences project under the National Research Council called Forecasting Future Disruptive Technology to identify national security impacts of forecasted technologies, will sponsor several conferences in countries and technologies of interest, and will conducted a future technology war-game at the National Defense University, focused on the potential disruptive impact of commercially available technologies. In coordination with the National Intelligence Committee and the Defense Intelligence Community effort to Strengthen Science and Technology Analysis, this program will initiate the implementation of a structured enterprise approach to determine, prioritize, track, distribute and evaluate S&T intelligence requirement and will generate a report on the health of Defense S&T Intelligence to support the defense S&T program. Country specific reports by the Library of Congress Federal Research Division commissioned in FY 2009 will be finalized, additional reports will be commissioned and the program will initiate development of Web 2.0 based information technology solutions geared to increase global technology awareness.				

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

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E. Performance Metrics

N/A